REMARKS

In response to the Office Action dated July 14, 2006, Applicants respectfully request reconsideration based on the following remarks. Applicants respectfully submit that the claims as presented are in condition for allowance.

Claims 1-7 are pending in the present Application for consideration upon entry of the following remarks. Claim 1 has been amended. No claims have been cancelled from or added to the original list of claims.

Support for the amendments to claim 1 are at least found in the specification, the figures, and the claims as originally filed. More particularly, support for amended claim 1 is at least found in the specification at page 5 lines 30-33 and page 6, lines 1-10 and Figures 2, 3, 5 and 6. No new matter has been added.

Reconsideration and allowance of the claims are respectfully requested in view of the following remarks.

Specification

The specification is amended to accordingly reflect the amendments to claim 1. No new matters have been added by these amendments. Applicants respectfully request consideration and entry of the amendments.

Claim Rejections Under 35 U.S.C. §103(a)

Claims 1-3 and 5-7

Claims 1-3 and 5-7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over newly cited Watabe (U.S. Patent No. 5,500,256 A) in view of Murakami et al. (U.S. Patent No. 5,728,223 A). Applicants respectfully traverse.

To establish *prima facie* obviousness of a claimed invention, three requirements must be met: (1) There must be some suggestion or motivation, either in the reference themselves or in the knowledge generally available to one of ordinary skill in the art to combine reference teachings; (2) There must be a reasonable expectation of success; and (3) the prior art references must teach or suggest all the claim limitations. (*See* MPEP § 2143.)

*I. Watabe in view of Murakami et al. fails to teach or suggest a **distributing block** connected to a first gas supply line to uniformly distribute the first reactive gas.*

Amended claim 1, in relevant part, recites, *inter alia*:

". . . [A] **distributing block** which is connected to a first gas supply line to uniformly **distribute** the first reactive gas . . ."

In the details of the Office action, the Examiner considers a collar (36) in Watabe as disclosing a distributing block (52) of the claimed invention. (*See* Page 2 of the Office action.) In the claimed invention, the distributing block (52) is connected to a feeding block (51) through a first gas transfer pipe (53) and serves the function of uniformly **distributing** a first reactant gas. However, the collar (36) in Watabe serves the function of **combining** gas supply pipes (3a and 3b), which transfer a first reactant gas and a second reactant gas, respectively, with an insulating upper lid (31). Therefore, the collar (36) in Watabe cannot be considered as disclosing the distributing block (52) of the claimed invention. Accordingly, Watabe in view of Murakami et al. fail to teach or suggest a distributing block (52) of the claimed invention.

*II. Watabe in view of Murakami et al. fails to teach or suggest an **upper diffusion block** connected to a first gas supply line to uniformly distribute the first reactive gas.*

Amended claim 1, in relevant part, recites, *inter alia*:

". . . [T]he **upper diffusion block** comprising: a connecting unit which is connected to the feeding block and includes first feeding holes which are respectively connected to the first gas transfer pipes and a second feeding hole which is connected to the second gas transfer pipe . . ."

In the details of the Office action, the Examiner considers O-rings (35) in Watabe as disclosing an upper diffusion block (70) of the claimed invention. (*See* Page 3 of the Office action.) In the claimed invention, an upper diffusion block (70) is a cylindrical body where paths for transferring a first reactant gas and a second reactant gas are formed. However, referring to FIG. 3 of Watabe, O-rings 35 are inserted into the spaces between the inner circumferential plane of the through holes and the gas supply pipes 3a and 3b to hermetically seal the spaces therebetween. (*See* Col. 5, line 67- col. 6, line 3) In sum, the upper diffusion block 70 of the present invention and the O-rings 35 of Watabe are different in configuration and function. In sum, the O-rings (35) serve the function of a seal, not a body where transferring paths are

formed. Therefore, the O-rings (35) of Watabe cannot be considered as disclosing the upper diffusion block (70) of the present invention. Accordingly, Watabe in view of Murakami et al. fails to teach or suggest upper diffusion block (70) of the claimed invention.

III. Watabe in view of Murakami et al. fails to teach or suggest ***first and second main flow paths*** *and* ***first and second sub-flow paths*** *cooperating to form flow paths.*

Amended claim 1 recites, in relevant parts, *inter alia*:

"[T]he upper diffusion block comprising:
a connecting unit which is connected to the feeding block and includes first feeding holes which are respectively connected to the first gas transfer pipes and a second feeding hole which is connected to the second gas transfer pipe;
a plurality of **first main flow paths** which are formed on the bottom of the upper diffusion block, which are connected to the first feeding holes, respectively, and are **radially and symmetrically** formed around the center of the connecting unit; and
a plurality of **first sub-flow paths**, which are formed in the bottom of the upper diffusion block and extend perpendicularly from each of the first main flow paths,
the intermediate diffusion block comprising:
a plurality of **second main flow paths**, which are formed in the top surface of the intermediate diffusion block, respectively correspond to the first main flow paths and respectively **form main flow paths in cooperation to the corresponding first main flow paths** when the intermediate diffusion block is adhered to the bottom of the upper diffusion block; and
a plurality of **second sub-flow paths** which are formed in the top surface of the intermediate diffusion block, respectively correspond to the first sub-flow paths and respectively form sub-flow paths in cooperation with the corresponding first sub-flow paths when the intermediate diffusion block is adhered to the bottom of the upper diffusion block. . . "

In the details of the Office action, the Examiner considers the gas flow paths (1a) in Watabe as disclosing the first main flow paths (75) of the claimed invention. (*See* Page 3 of the Office action.) In the claimed invention, the first main flow paths (75) are formed on the **bottom of the upper diffusion block** (70), and **radially** and **symmetrically** formed around the center of the upper diffusion block (70). (*See* Figure 5.) However, in Watabe, the gas flow paths (1a) are formed **inside the lower support member** (30), and **spirally** formed from the inner circular start area to the outer circular end area. (*See* Figures 1A, 3 and 4A.)

Therefore, because the gas flow paths (1a) in Watabe and the first main flow paths (75) of the claimed invention are different in structure and location, the flow paths (1a) of Watabe cannot be considered as disclosing the first main flow paths (75) of the present invention. Such

radial structure of the gas paths of the claimed invention allows the length of the gas paths in the claimed invention to be shorter than that of the gas paths formed spirally in Watabe. Thus, when a reactant gas is supplied to the gas paths with a fixed pressure, less time is required to flow the reactant gas along the gas paths in the present invention relative to Watabe.

Also, in the details of the Office action, the Examiner considers a main branch member (31) in Murakami et al. as corresponding with the second main flow paths (75) of the claimed invention and considers another main branch member (32) in Murakami et al. as corresponding with the second main flow paths (85). (*See* Pages 5-7 of the Office action.)

In the claimed invention, the first main flow paths (75) **correspond to second main flow paths** (85), and main flow paths are formed by the **cooperation** of the first main flow paths (75) and the second main flow paths (85). Also, first sub-flow paths (76) **correspond to second sub-flow paths** (86) and sub-flow paths are formed by **cooperation** of the first sub-flow paths (76) and second sub-flow paths (86). Both of the main flow paths and the sub-flow paths are for a first reactant gas.

However, a main branch of the member (31) of Murakami et al., which the Examiner considers as disclosing the first main flow paths (75) in the present invention, is for one reactant gas. Also, a main branch of the member (32) of Murakami et al., which the Examiner considers as disclosing the second main flow paths (85) in the present invention, is for another reactant gas. In sum, a main branch of the member (31) in Murakami et al. and another main branch of the member (32) in Murakami et al. are not cooperated. Thus, Watabe in view of Murakami et al. fails to teach or suggest first and second main flow paths and first and second sub-flow paths cooperating to form flow paths.

IV. Watabe in view of Murakami et al. fails to teach or suggest ***first and second distributing holes*** *and* ***first and second spray holes*** *respectively spraying a first and second reactive gases.*

Amended claim 1 recites, in relevant part, *inter alia*:

". . . [A] plurality of **first distributing holes** which are formed at regular intervals in the second sub-flow paths and second main flow paths; and

a **second distributing hole** connected to the second feeding hole,

the lower diffusion block comprising:

a plurality of **first spray holes** connected to the first distributing holes, respectively, for spraying the first reactive gas on the wafer; and

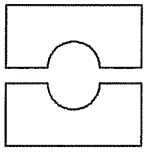
a plurality of **second spray holes** formed between the first spray holes for spraying the second reactive gas on the wafer."

In the claimed invention, a first reactant gas is sprayed on the wafer through first distributing holes (83) and first spray holes (93), and a second reactant gas is sprayed on the wafer through second distributing holes (84) and second spray holes (94). (*See* Figures 7 and 8.) However, in Murakami et al., two reactant gases are mixed in a gas-mixing chamber (26) then sprayed on a wafer through a nozzle (29). (*See* Figure 2.) Thus in Murakami et al., each of the reactant gases are not separately sprayed through respective spraying holes, but are mixed in the gas chamber and uniformly sprayed to a wafer. (*See* Abstract.) Thus, Watabe and Murakami et al. fail to teach or suggest first and second distributing holes and first and second spray holes respectively spraying a first and second reactive gases.

In sum, Watabe and Murakami et al., either alone or in combination, fail to teach or suggest the (1) distributing block connected to a first gas supply line to uniformly distribute the first reactive gas; (2) upper diffusion block; (3) first and second main flow paths and first and second sub flow paths cooperating to form flow paths; and (4) first and second distributing holes and first and second spray holes respectively spraying a first and second reactive gases. Thus, Watabe in view of Murakami et al. fails to teach or suggest all of the elements of claim 1. Claims 2-3 and 5-7 inherit all of the limitations of claim 1 and correspondingly allowable as depending from an allowable claim. Reconsideration, withdrawal of the relevant rejections and allowance of claims 1-3 and 5-7 are thus respectfully requested.

Difference in purpose and effect between claimed invention and cited art

Referring to FIG. 3 of Watabe, gas flow paths are formed inside a block 30 and the shape of the gas flow paths is spiral. A plurality of gas flow path are respectively manufactured by a plurality of spiral members and assembled in one block. Therefore, the manufacturing and assembling of Watabe's showerhead is more difficult. However, in the present invention, first main flow paths are formed on the bottom surface of the upper diffusion block and second main flow paths are



formed on the top surface of the intermediate diffusion block. Namely, main flow paths are formed by cooperation of the first main flow paths on the bottom surface of the upper diffusion block and the second main flow paths on the top surface of the intermediate diffusion block. Therefore, manufacturing and assembling of the showerhead of the present invention is easier than that of Watabe.

In the present invention, the respective gas paths for transferring two reactant gases have different shapes and conductance. When reactant gas with high mobility is transferred through a gas path with lower conductance and reactant gas with low mobility is transferred through a gas path with higher conductance, the amounts sprayed from each spray hole can be controlled equally. However, in Watabe, the respective gas paths for transferring two reactant gases have the same shape and conductance. When reactant gases with different mobility are transferred through the gas paths respectively, the amounts sprayed from each spray hole are different.

Gas paths of the present invention are formed radially, but gas paths of Watabe are formed spirally. The path length from the center to the edge of the showerhead of Watabe is longer than that of the present invention. When the reactant gas is supplied with a certain fixed pressure, the time required to pass all of the gas along the path length of the present invention is shorter than that of Watabe. UPH (Unit per Hour) of the present invention can be improved.

Claim 4

Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Watabe in view of Murakami et al. in further view of Hayakawa et al. (U.S. Patent No. 5,447,568 A). Applicants respectfully traverse.

As discussed above, Watabe and Murakami et al., either alone or in combination, fail to teach or suggest the (1) distributing block connected to a first gas supply line to uniformly distribute the first reactive gas; (2) upper diffusion block; (3) first and second main flow paths and first and second sub flow paths cooperating to form flow paths; and (4) first and second distributing holes and first and second spray holes respectively spraying a first and second reactive gases. Also, Hayakawa et al. fails to teach or suggest any of the above listed elements. Thus, Watabe in view of Murakami et al. and Hayakawa et al. fails to teach or suggest all of the elements of claim 1. Claim 4 inherits all of the limitations of claim 1 and is correspondingly

allowable as depending from an allowable claim. Reconsideration, withdrawal of the relevant rejections and allowance of claim 4 are thus respectfully requested.

Conclusion

All of the objections and rejections are herein overcome. In view of the foregoing, it is respectfully submitted that the instant application is in condition for allowance. No new matter is added by way of the present Amendments and Remarks, as support is found throughout the original filed specification, claims and drawings. Prompt issuance of Notice of Allowance is respectfully requested.

The Examiner is invited to contact Applicants' attorney at the below listed phone number regarding this response or otherwise concerning the present application.

Applicants hereby petition for any necessary extension of time required under 37 C.F.R. 1.136(a) or 1.136(b) which may be required for entry and consideration of the present Reply.

If there are any charges due with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by Applicants' attorneys.

Respectfully submitted,

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Date: October 16, 2006